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Tillage Options for Conservation Farmers





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Cover: No-till soybeans in wheat stubble.

Tillage Options for Conservation Farmers

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No-till on the contour in soybean residue.

Introduction

American farmers have long been a mainstay of our Nation. Although they represent only a small portion of the general population, today's farmers provide our Nation with its food and fiber as well as surpluses for export. Throughout the years, American farmers have sought ways to improve their operations and increase productivity. Conservation tillage is an important tool in helping ensure the future productivity and profitability of America's cropland. Combating soil erosion and providing economic advantages to farmers are the primary benefits of conservation tillage.

This brochure was prepared in cooperation with the Conservation Technology Information Center (CTIC), a special project of the National Association of Conservation Districts (NACD). It describes the various conservation tillage techniques to help farmers decide which ones are best for them. Keeping their own specific needs, equipment, skills, and land in mind, farmers also can design an individualized tillage system by selecting suitable elements from various conservation tillage techniques.

Conservation tillage refers to any tillage and planting system that is designed to reduce soil erosion caused by water or wind. To reduce soil erosion by water, a minimum of 30 percent of the soil surface is kept covered by residue after planting. Where wind erosion is a problem, at least 1,000 pounds per acre of flat small-grain residue equivalent are maintained on the soil surface during the critical erosion period.

Which Conservation Tillage Type Is Best for You?

- No-Till** The soil is left undisturbed prior to planting. Planting is completed in a narrow seedbed or slot created by a planter or drill. Weeds are controlled primarily with herbicides.
- Mulch-Till** The total soil surface is disturbed by tillage prior to planting. Tillage tools such as chisels, field cultivators, disks, sweeps, or blades are used. Weeds are controlled with herbicides and/or cultivation.
- Ridge-Till** The soil is left undisturbed prior to planting. The seedbed is prepared on ridges with sweeps, disks, or other row cleaners. The ridges are rebuilt during cultivation. Weeds are controlled with herbicides and/or cultivation.
- Strip-Till** The soil is left undisturbed prior to planting. Tillage in the row is done at planting using tools such as a roto-tiller, an in-row chisel, or other row cleaners. Weeds are controlled with herbicides and/or cultivation.



No-till soybeans in corn residue.



No-Till

Benefits:

- No-till dramatically reduces soil erosion.
- Virtually all crop residue remains on the soil surface and thus protects the soil from most of the damages caused by wind and rain.
- Crop residue on the soil surface reduces runoff and retains moisture.
- Expenses for equipment decrease because the farmer doesn't need a plow, disk, or field cultivator.
- The farmer saves time and fuel because of fewer trips across the field with heavy equipment. In addition, fewer trips reduce compaction.
- No-till helps build organic matter.
- Residue from the previous crop remains standing throughout the winter. The residue reduces soil erosion, provides shelter for wildlife, reduces evaporation, and traps snow which increases moisture.
- Using existing row patterns for controlled traffic helps eliminate compaction.

Considerations:

- No-till requires skillful management.
- No-till restricts the farmer to surface-applied herbicides.
- For best results, fertilizers should be injected or banded. This is particularly true for nitrogen, especially for those forms that are volatile.
- Weed control is primarily dependent upon herbicides.
- The soil warms up more slowly in the spring with no-till than it does with conventional tillage.



Mulch-Till

Benefits:

- Although the total soil surface is tilled, sufficient residue is left on the soil surface to reduce erosion significantly.
- A portion of the crop residue is incorporated into the top few inches of the soil.
- Mulch-tillage is useful on many different soils—including poorly drained soils.
- This system increases roughness and infiltration more than conventional tillage.
- Because it is most similar to conventional tillage, mulch-tillage is the most likely of the systems to be tried first by a farmer. It is adaptable to a wide variety of soils. The options for controlling weeds are greater than for most other conservation tillage types.
- Mulch-tillage allows the incorporation of surface-applied fertilizers and pesticides.

Considerations:

- Mulch-tillage requires more trips across a field than other conservation tillage types.
- It is similar to conventional tillage in labor, equipment, and fuel costs.
- A farmer who uses mulch-tillage must maintain primary and secondary tillage implements or a combination implement.
- Some residue is buried. This limits the erosion-reducing potential of the system.



Ridge-Till

Benefits:

- Significant erosion reduction is possible.
- Residue is placed in valleys between ridges, leaving less residue to interfere with planting.
- Ridges have less residue and, because of their elevation, drain faster and warm up more quickly in the spring than do nonridged surfaces. Therefore earlier planting is possible.
- Residue in valleys helps support a tractor in wet spots.
- Tops of ridges provide an optimal seedbed.
- Residue from corn, soybeans, and other crops remains standing throughout winter. The residue reduces erosion, provides shelter for wildlife, reduces evaporation, and traps snow, which increases moisture.
- Herbicides are often applied in a band, reducing the total amount applied.
- Cultivation is used to help control weeds and to rebuild ridges for next year's planting.
- Controlled traffic reduces damage from compaction on the growing area.

Considerations:

- A special planter or planter attachment that can plant on ridges is required.
- Wheel and tire widths of fertilizer spreaders, tractors, and combines need to be adjusted to run in the valley between the ridges.
- End rows can present a problem to equipment when turning because of the ridged surface. Most farmers opt to use no-till or mulch-till on the end rows.
- Ridge-till requires skillful management.



Strip-Till

Benefits:

- Clean strips of ground tend to warm up faster than soil covered with crop residue.
- Herbicides are often applied in a band or strip, reducing the total amount applied.
- The clean strip may provide better seed-soil contact for small seeds.
- Strip-till requires a significantly reduced number of trips over the field compared to conventional tillage.
- Controlled traffic means reduced compaction in the growing area.

Considerations:

- The clean strips are more erodible than soil that is covered with residue; contour farming may be necessary.
- Special equipment is needed to provide the clean strips.
- Because of the special equipment required, strip-till planting may be more expensive to use than other conservation tillage types.
- Soil moisture requirements at planting time may be more critical, and soil structure may be damaged by improper operation of rotary strip-till planters.

Summary

No-till, mulch-till, ridge-till, and strip-till are conservation tillage types that are readily available to 20th-century farmers. The system that a farmer chooses will depend on the location, soil type, crop being grown, and other site-specific factors. The benefits that each system will afford will be in direct proportion to the degree of management skills or effort expended.

Conservation tillage requires a high level of management; however, as more farmers weigh the actual advantages of the various conservation tillage types available to them in relation to conventional tillage, many will convert their farming practices to conservation tillage.

Conservation tillage can help farmers maintain compliance with the conservation provisions of the Food Security Act of 1985.

Assistance Available

Soil Conservation Service (SCS)—SCS is an agency of the U.S. Department of Agriculture (USDA) that provides technical assistance to farmers to help them identify, assess, and correct soil and water conservation problems.

Agricultural Stabilization and Conservation Service (ASCS)—ASCS is an agency of USDA administering conservation cost-sharing funds.

Cooperative Extension Service (CES)—At the local, State, and Federal levels, county agents and other CES agricultural specialists provide information about conservation and cropping needs.

Conservation Technology Information Center (CTIC)—CTIC will help growers locate technical people and information to assist them with conservation tillage systems.

Conservation Districts—Local conservation districts may provide conservation tillage equipment to farmers, allowing growers to try new methods without first having to purchase equipment. Many districts conduct demonstrations and field days to promote conservation tillage systems.

Private Industry—Local dealers may rent conservation tillage equipment to allow farmers to try conservation tillage methods before making equipment purchases. Seed, fertilizer, and chemical representatives are available with recommendations and suggestions to fine-tune or perfect the type of conservation tillage a farmer adopts for his or her farming operation.

Successful Farmers—Names of successful farmers who are practicing conservation tillage in your county can be obtained from participating agencies. Many farmers are willing to share their experience and expertise.

All programs and services of U.S. Department of Agriculture agencies are offered on a nondiscriminatory basis without regard to race, color, national origin, religion, sex, age, marital status, or handicap.



Mulch-tillage in corn residue.

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P.O. Box 2890
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